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ABSTRACT

A fading procedure to maintain student pacing in personalized instruction courses in two settings--a small educational psychology course at a public university and a large psychology course at a private university--was investigated. Students in both courses were divided into two groups. The first group had gradually lengthened unit completion deadlines (target dates) and the other group had no pacing restrictions. No differences were found for grade point averages and pretest scores, units mastered at target dates, final examination scores, pre/post gain scores, unit quiz attempts, and instructor-student contacts. (Author)

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EVALUATING A PROCEDURE TO MAINTAIN STUDENT PROGRESS IN PERSONALIZED INSTRUCTION COURSES

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The problems of student withdrawals and procrastination in PSI courses are strongly related. PSI's flexible pacing feature allows some students to fall dangerously behind in their unit work, at which point they may either withdraw from the course, or complete the course with a failing or "incomplete" grade. The successful PSI student must usually work at a fairly steady rate throughout the semester.

The problems of withdrawals and procrastination in PSI courses has been frequently cited in the literature. Keller (1968) reported grade distributions from four early PSI classes which had combined failure/incomplete/withdrawal rates of approximately 30%, 43%, 10%, and 14%. The Personalized System of Instruction Newsletter has also conducted two surveys of PSI users. In the first survey (PSI Newsletter, June 1972), the procrastination problem was the difficulty mentioned most often in the 190 responses received, and a high dropout rate was the second most frequent problem cited. These findings were repeated in a second survey conducted two years later (PSI Newsletter, June 1974). In this survey, 438 responses were received, and 71% of the PSI teachers reported difficulty with procrastination. Approximately 25% of the respondents also reported a higher-than-usual proportion of students withdrawing.

Perhaps in response to this perceived problem, no component of PSI has been more frequently examined than student pacing. In an early review of PSI, Ryan (1974) surveyed over 30 reports of PSI courses and found withdrawal rates ranging from 0-20%. Ryan also noted that, although one study found that the GPA's of withdrawing students were considerably lower than those of students who completed the course (Born, Gledhill, & Davis, 1972), another study found no differences in GPA's between the two groups (Sheppard & MacDermot, 1970). Ryan concluded that "Unfortunately, the data required for a detailed analysis of the overall effects of withdrawals are not available at the

present time. . . . Clearly, a personalized course does not necessarily mean a high level of student withdrawal" (p. 18).

The contradictory evidence concerning withdrawal rates in PSI classes is also found in more recent reviews of the PSI literature. Taveggia (1976) surveyed over 200 reports on PSI which appeared from 1967-1974 and generally found a higher overall withdrawal rate from PSI classes. Taveggia attributed the higher rate to PSI's self-pacing feature, frequent feedback to students, and "the fact that PSI courses tend to be considerably more difficult than conventional courses" (p. 1031). After reviewing the data on student procrastination and withdrawals, the author notes: "Given the inconsistency of these results, we can only conclude that drop rates may be higher in PSI courses, but additional research is needed to determine the conditions under which this is true" (p. 1032).

In an extensive review of the literature, Robin (1976) analyzed the results of over 140 PSI studies. Robin also found that, although self-pacing is the feature most positively evaluated by PSI students, withdrawal rates were 40% higher for PSI compared to conventional lecture-discussion conditions in the studies reviewed. The author divides the attempts to understand the withdrawal problem into three broad categories: systems variables, student histories, and interactions of these two factors. The difference between withdrawing and remaining students was procratination in quiz taking (Born and Whelan, 1973), again relating self-pacing to student withdrawals. A number of studies (Malott & Svinkcki, 1969; Miller, Weaver, & Semb, 1974; Semb, Conyers, Spencer, & Sanchez-Sosa, 1975; Robin & Graham, 1974) have attempted to reduce student withdrawals by limiting student pacing through the use of deadlines. Not all of these attempts have been successful, and, as Robin notes: "Deadlines may prove aversive, actually increasing dropouts" (p. 326).

Robin classified the attempts to deal with the self-pacing problem into (1) providing deadlines or (2) providing prompts and/or reinforcement for high rates of unit work (Bitgood and Segrave, 1975; Burt, 1975; Green, 1971; Hess, 1974; Lloyd, 1971).

After reviewing the literature the author concludes: "The literature reaches a consensus that (a)self-pacing is often associated with procrastination; (b) both deadline and positive incentive systems can effectively combat procrastination and produce steady, evenly distributed rates of unit completion; and (c) limiting self-pacing has no effect on academic achievement" (p. 330). However, "The effects of deadlines on attitudinal responses are less clear-cut" (p. 329).

Finally, Hursh (1976) reviewed approximately 100 PSI studies and found 17 that addressed the issue of student procrastination. The use of point systems to reinforce progress, and the use of minimum-rate-of-progress contingencies, were both found effective in reducing procrastination. In reviewing the literature on student withdrawals in PSI courses, Hursh concludes that "given these results it is reasonable for investigators to attempt to document an effective means for assuring the early and consistent involvement of less skilled students in personalized courses" (p. 102).

In that same review, Hursh (1976) suggested a procedure for decreasing student procrastination and withdrawals while minimizing the use of aversive or arbitrary contingencies:

> In terms of enduring usefulness to instructors and especially students it seems desirable to set up a system that requires students to gradually take on pacing responsibility. Assuming a one-quiz-per-week optimum pace, one possibility is to require all students to take the first unit quiz within the first week of the term or semester, the second and third quizzes by the end of the third week, the fourth through the seventh quizzes by the end of the seventh week, and the remainder of the quizzes by the end of the term or semester. Opportunities to take the quizzes should only be available up to the given deadlines. Students failing to meet a deadline should be required to contract with the instructor for quizzing at an accelerated pace, with any remedial help to be provided by the instructor or proctor. (p. 98)

This was the procedure that was used in this investigation.

Method

Experiment I

Students

Undergraduate students enrolled in a three credit Fall 1977 introductory educational psychology course (titled Human Growth and Development) at West Virginia University participated as subjects in this study. Twelve students (three males and nine females) initially enrolled in the section; one of these students was a freshman, seven were sophomores, one was a junior, two were seniors, and one was a special student. One student withdrew, and one student never attended any classes. The mean grade point average of the students was 2.88, with a range of 1.92 to 4.0 on a 0-4.0 scale.

Students were aware in advance that they were enrolling in PSI sections, and they were informed of all course procedures on the first day of class. Students were randomly assigned to either the experimental or control group depending upon which of the two Course Policy Statements they received on the first day of class (see Procedure Section). Initially there were six students in the experimental group and six in the control group. One student in each of the two groups withdrew from the course and one student in the experimental group failed to complete the course and received a grade of "I" due to an automobile accident. This student missed only the final exam, which she subsequently tool the following week. She ultimately received an "A" grade.

Staff

The staff for the course consisted of a graduate instructor with previous PSI teaching experience and three external student proctors (Keller & Sherman, 1974). The instructor's responsibilities included preparing course materials, answering student questions, and overseeing the general operation of the course. The external proctors were students who had taken the course previously and were invited back to serve on the staff due to their superior performance. Their responsibilities included course record-keeping, suiz grading, and

assisting students. Finally, the students enrolled in the class were required to proctor at least five of their classmates' quizzes (over units they had already mastered) in order to receive a grade. In general the course followed the PSI procedures and features outlined by Keller (1968).

Setting

The course operated from one to three p.m. on Mondays and Wednesdays. Students could attend any class periods they wished to during the semester; attendance was not required. The course was held in the College of Human Resources and Education's Learning Center, and Learning Center clerical help were used to distribute quiz forms to students and monitor quiz taking. All other course activities were supervised by the graduate instructor.

Course Materials

The course consisted of 12 units of materials plus a Readiness Unit (Unit 0) at the beginning of the course. The Readiness Unit covered the theory of PSI and all course procedures. The remaining 12 units of material covered the texts Educational Psychology: The Science of Learning and Instruction (1974) by R. Anderson and G. Faust, and Parents are Teachers (1971) by W. Becker. Each unit was composed of a text reading assignment, objectives for the reading assignment, study questions for students to answer over the unit assignment, and three equivalent-difficulty forms of a unit quiz with accompanying proctor answer keys. The mean amount of text reading assigned per unit was slightly more than 32 pages (range: 14-61 pages). Unit quizzes were composed of eight to 13 questions (mainly short-answer essay format) with a demonstrable, logical relationship to the unit objectives. The study guide for the course has been published (Johnson & Perkins, 1976).

Other course materials included a pretest/final and an alternate form of the final exam. The pretest contained the same 11 items as the first form of the fianl exam. The items on this pretest/final were short answer essay questions which were designed to be comprehensive, i.e., to cover material that was taught throughout the course. There were an additional

12 items on the pretest/first final that were designed to test generalization from course content; these items were not included in the final exam score calculation or any other data analysis. A second form of the final exam, which contained parallel but unique items, was given to any student who took advantage of the early-unit-completion/final exam retake option. However, only data from the first attempt at the final exam were analyzed. In designing the three parallel forms of the unit quizzes, questions were written over each unit objective and then randomly assigned to each quiz form so that the quiz forms would contain equivalent objective coverage.

All quiz and test items in the course were keyed to unit objectives, and all tests were graded using accompanying answer keys. One item on the pretest/final appeared on one form of a unit quiz. No other item on the pretest or final exams appeared in any of the unit material, and these major tests were graded without student identification. At least 30% of all quizzes and tests were regraded at the conclusion of the course for grader reliability. The pretests, unit quizzes, and final exams which were regraded were chosen randomly, and reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements for each item. A disagreement for any part of an item was scored as a disagreement for the entire item. The grader reliabilities obtained were .95 for the pretest, .98 for the unit quizzes, and .97 for the final exams.

Procedure

This study used a two group design to investigate student pacing through a PSI course. The experimental group used a gradually lengthening series of target dates to fade in appropriate pacing; the control group was completely "self-paced." The course ran from August 24 to December 9, and had a total of 30 class days on which unit quizzes were available.

On the first day of class, after a brief introductory lecture by the graduate instructor, the students filled out an information form and were given a Course Policy Statement

which explained in detail how the course would operate. The two versions of the Course Policy Statement were identical except that the policy statement given to the experimental group contained the following additional paragraph:

> Some students find the freedom of a PSI class difficult to handle initially. Therefore, we have established some minimal deadlines for you to meet early in the term to assist you with your pacing. The first unit (Unit 1) must be mastered by the end of the first week of the class; the third unit must be mastered by the end of the third week of class; and the seventh unit must be mastered by the end of the seventh week of the term. In summary, the deadlines are:
>
> Unit One mastered by September 7
> Unit Three mastered by September 21
> Unit Seven mastered by October 19
>
> If you fail to meet these deadlines, you must contact the instructor immediately. This will be your responsibility. We will then meet with you and set up a schedule to get you back on target.

After the students had an opportunity to read the Course Policy and ask any questions, the pretest was distributed. Students were asked to respond to each question on the pretest; if they did not know the answer to a question they were asked to write out "don't know." When they finished their pretests, the students received a chart on which they could graph their progress through the course (Hess, 1974). The students were then excused from their first (and only) group meeting.

The next time a student came to class, he or she was required to take the Readiness Quiz. When the proctor was satisfied that the student could answer all the questions (which covered course procedures), the student was free to proceed through the course in the manner outlined by Keller (1968), with the following exceptions. There were no contingencies placed on the porgress of students in the control group. These students were allowed to proceed through the course at any pace they felt appropriate; however, they were expected to complete the course within the semester. Students in the experimental group were required to meet with the instructor if they failed to master the required number of

units by the appropriate target date. At these meetings, the instructor noted the student's slow rate of progress, suggested strategies for the student to get back "on target," and inquired whether the student was having any difficulties. The student was not threatened or punished at these meetings. Students' progress records were reviewed at the end of each week by the staff to insure that students in the experimental group who failed to meet the target dates did, in fact, meet with the instructor. Students who were on or ahead of the target date pace were not contacted by the instructor.

In addition to the data on student demographics, pacing, performance, and course evaluation, data were also collected on the number of instructor-student contacts throughout the smester to ascertain whether there were any differential effects by group on this variable. During class hours, the graduate instructor recorded the number of student contacts. These data were collected by group, and scoring reliability was assessed by having a course proctor occasionally listen, as unobtrusively as possible, to the interactions. The observer knew the students' identities. Reliability was computed by observing interactions and dividing the total number of agreements by the total number of agreements plus disagreements. Scorer reliabilty, with 14 of the 30 class sessions (47%) observed throughout the term, was .93 for the number of interactions.

Students were required to master (at a 90% level or above) all 12 units in order to be eligible to take the final exam. Students could take the final exam at any class period after they mastered the units, up to and including the regularly scheduled final exam period. Students who completed the course before the end of the semester could take a second form of the final exam if they wished; only the higher of the two final exam scores was counted toward their final grade. Two students took advantage of this retake option; however, only the score on their final exam was included in the data analysis. Mastering all 12 units, and a final exam score of 70-79%, gave the student a final grade of "C." To receive a "B" grade required

a score of 80-89% on the final exam; an "A" grade required 90% or above on the final exam. Before their first attempt at the final exam, the students were asked to once again complete the course evaluation questionnaire and place it in their folder.

Experiment 2

Students

Undergraduate students enrolled in a four credit Fall 1977 introductory psychology course (titled General Psychology) at Georgetown University participated as subjects in this study. The number of students initially enrolled in the course was 111; two of these students never attended any class sessions. Of the remaining 109 students (59 male and 50 female), 33 were freshman, 43 were sophomores, 18 were juniors, and 15 were seniors. The mean grade point average (self-reported) of the students was 3.24, with a range of 1.75 to 4.0 scale.

Students were aware in advance that they were enrolling in a PSI class, and they were informed of all course procedures at the first class meeting. Students were randomly assigned to either the experimental or control group depending on which of the two Course Polisy Statements they received on the frist day of class (see Procedure section). Initially there were 56 students in the experimental group and 55 in the control group. One student from each of the two groups did not complete any units.

Staff

The staff for the course consisted of an instructor and a course manager. The instructor's responsibilities included preparing course materials, answering student questions, proctoring quizzes, giving lectures, and overseeing the general operation of the course. The course manager was a student who had completed the course previously and was invited back to serve as course manager due to his superior performance. The course manager's responsibilities included course record-keeping, quiz grading, overseeing the operation of the internal proctoring system (Sherman, 1974), and assisting the students

and the instructor. Additionally, the students enrolled in the class were allowed to proctor their classmates' quizzes over units they had already mastered. The students received one point toward their final grade (up to a maximum of 12 points) for each full period they served as internal proctors. In general, the rest of the course operated utilizing the PSI procedures and features outlined by Keller (1968), with the addition of four lectures where attendance was required.

Setting

The course operated from 10:15 a.m. to 12:05 on Mondays and Wednesdays. With the exception of the four class periods on which required lectures were given, the students could attend any class period they wished in order to take unit quizzes. The course was held in a large, standard classroom at Georgetown University. Quiz taking, proctoring, and studying took place at designated areas throughout the room. All course functions were performed and supervised by the course staff.

Course Materials

The course consisted of 12 units of material plus a Course Procedures Quiz at the beginning of the course. The 12 units of material covered 12 chapters in the text Basic Psychology (3rd Ed.) by H. Kendler (1975). Each unit consisted of a chapter reading assignment in the text, objectives for the reading assignment, review and self-test questions over the unit assignment, and three equivalent-difficult forms of a unit quiz with accompanying proctor answer keys. The mean amount of text reading assigned per unit was slightly more than 39 pages (range: 21-66 pages). Unit quizzes were composed of nine to 12 questions (mostly multiple-choice format) with a demonstrable, logical relationship to the unit objectives. The materials had been used previously, and the study guide used in the course has been published (Kendler, 1975).

Other course materials included a pretest, and two parallel alternate forms of the final exam. The pretest and both forms

of the final exam contained 52 multiple-choice items from which the students were allowed to choose 50 questions to answer. Items on the pretest and two forms of the final exam were designed to be comprehensive, i.e., to cover material that was taught throughout the course. All of the items on the pretest were taken from unit quizzes; half of the items on the final exams were taken from unit quiz forms. All test items had been used and revised (where necessary) for three semesters. A second form of the final exam was given to any student who took advantage of the early-unit-completion/final exam retake option. However, only data from the students' first attempt at the final exam were analyzed.

There was no unit quiz for Unit 12. Students were required to read through the unit assignment (which covered behavior pathology) and develop original study material and quizzes based on criteria presented in the unit. The students were allowed to hand in this final unit assignment any time before the final examination; therefore, this unit is not included in any of the student pacing data analyses for this experiment.

All quiz and test items in the course were keyed to unit objectives, and all tests were graded using accompanying answer keys. The pretests and final examinations were graded without student identification. At least 30% of all quizzes and tests were regraded at the conclusion of the course for grader reliability. The pretests, unit quizzes, and final exams which were regraded were chosen randomly, and reliability was calculated by dividing the number of item agreements by the number of item agreements plus disagreements for each item. The grader reliabilities obtained were .99 for the pretest, .99 for the unit quizzes, and 1.00 for the final exams.

Procedure

The experimental design used for this experiment was identical to that used in Experiment I. The experimental group used a gradually lengthening series of target dates to fade in appropriate pacing; the control group was completely "self-paced." The course ran from August 31 to December 7,

and had a total of 23 class days on which unit quizzes were available.

On the first day of class the instructor gave an introductory lecture and then asked the students to complete the pretest according to the procedure described in Experiment I. On the second day of class the instructor gave another (required) lecture, distributed the Course Policy Statement, and then asked the students to complete the Course Procedure Quiz and have it proctored. Two versions of the Course Policy Statement were distributed at random. The versions were identical except that the policy statement given to the experimental group contained the following additional paragraph:

> Some students find the freedom of a PSI class difficult to handle initially. Therefore, we have established some minimal deadlines for you to meet early in the term: the first unit must be mastered by about the end of the first week of class; the third unit must be mastered by about the third week of class, the seventh unit must be mastered by the seventh week of the term. If you fail to meet these deadlines, it is your responsibility to contact the instructor as soon as possible. We will meet with you and set up a schedule to get you back on target. In summary, the target dates are:
>
> Unit 1 - September 12
> Unit 3 - September 26
> Unit 7 - October 31

The students also received a recommended progress schedule for the course on this day.

Starting with the third day of class, the student was free to proceed through the course in the manner outlined by Keller (1968), with the following exceptions. There were, as in Experiment I, no contingencies placed on the progress of students in the control group. These students were allowed to proceed through the course at any pace they felt appropriate, although they were expected to complete the course within the semester. Students in the experimental group were required to contact the instructor of course manager if they fail to master a unit (at a ()% level or above) by the appropriate target date. At these meetings the student's slow rate of progress was noted and strategies were suggested to enable the student get back

"on target." Student progress records were reviewed at the end of each week to insure that students in the experimental group had contacted the instructor or course manager. Students who were at or ahead of the target date pace were not contacted. With the exception of the two additional required lectures, all other course procedures were identical to those used in Experiment I.

Each unit mastered counted 20 points toward the student's final grade (for a possible 240 points). The final exam was worth a maximum of 100 points, and there was a maximum of 12 points that students could earn for internal proctoring. Students who completed all the units before the end of the semester could take one of two "early" final examinations offered (on November 9 and November 30). Students who were not satisfied with their score were allowed to take another form of the final examination at a later testing date; only the higher of the two scores counted toward their final grade. Nine students took advantage of this retake option; however, only the score on the first attempt at the final exam is included in the data analysis. All students were required to complete the comprehensive final exam by the scheduled exam date.

A summary of comparisons between the courses used in these studies is specified in Table 3.

Results

Experiment I

Premeasures. In order to assess the equivalence of the two randomly-assigned groups on measures that may effect pacing through the course, data were collected on grade point averages and pretest scores for both the target date and control groups. The mean grade point average for the target date group 3.06 (standard deviation .28) out of a possible 4.0 and the mean grade point average for the control group was 2.71 (standard deviation .74). A t-test for independent means failed to reach significance at the $p < .05$ level ($t = .55$, $df = 8$, NS). The student in the target date group who received

a grade of "I" had the lowest grade point average in the group, 2.61; the student in that group who withdrew had a grade point average of 3.07. The student who withdrew from the control group had a grade point average of 1.92, also the lowest of the group.

The mean score on the course pretest for the target date group was 3.40 (standard deviation 3.57) out of a possible 100; for the control group the mean score was 0. A t-test for independent means for these data also failed to reach significance at the p .05 level ($t = 1.33$, $df = 8$). Neither of the students who withdrew from the course took the pretest. The student in the target date group who received an "I" grade scored 3 on the pretest.

Therefore, it was concluded that the two groups were equivalent with regard to grade point averages and pretest scores.

Rate Measures. Figure 1 presents a summary of student progress at the 3 target dates of the course. The figure shows less variability in the progress rate of the target date students as compared to the progress rate of the self-paced (control) students.

The mean number of units mastered at each of the 3 target dates was computed for both groups. For the target date (experimental) group, the mean number of units mastered was 1.6 at target date 1, 4 at target date 2, and 7.4 at target date 3. For the control group, the mean number of units mastered at the 3 target dates were 1.2, 3, and 6.6 respectively. Although at each date the target date group averaged slightly more units mastered, a t-test for independent means again failed to reach significance at any of the target dates. At target date 1, $t(8) = .73$, NS; at target date 2, $t(3) = 1$, NS; fianlly at target date 3, $t(8) = .45$, NS.

Figure 2 shows individual cumulative progress graphs for students in both groups in Experiment I. Each pip on the graph represents a test attempt. Through visual inspection it appears that students in the target date group progressed through the course at a much more even rate. The control group graphs

illustrates both end-of-course scalloping (student #7) and almost-linear rapid progress (student 9, the special student) which is less apparent in the target date students. However, the t-tests reported above revealed that this difference failed to reach statistical significance.

Course Performance Measures. In order to assess the effects of the target date procedure upon student performance in the course, a number of measures were taken. First, means were computed for the comprehensive final exam which was given when the students had mastered all the units. However, a t-test for independent means once again failed to reach significance, $t(8) = 1.91$, NS.

Another performance measure calculated in this experiment was the number of instructor-student contacts by students in each of the two groups. On this measure, students in the control group had a total of 52 instructor contacts as opposed to 22 instructor contacts in the target date group. This is a mean of 10.4 contacts for the control group and 4.4 contacts for the target date group. However, this difference also failed to reach statistical significance, $t(8) = 1.47$, NS.

Experiment 2

Premeasures. The same data were compiled in Experiment 2 to assess the equivalence of the randomly-assigned groups (on measures that may effect student pacing through the course) as were collected in Experiment I. The mean grade point average (self-reported) for the target date group was 3.15 (SD = .43) on a 4.0 scale. The grade point average (self-reported) for the control group was slightly higher at 3.32 (SD = .34). A t-test for independent means showed that this difference failed to reach significance, $t(68) = .29$, NS. Grade point averages were not available for 2 students in the target date group and 3 students in the control group. It should be noted that no grade point averages were computed for the first-semester freshmen in the class (17 in the target date group and 16 in the control group). Two students, one from each group, dropped the course without attempting any

unit work; both students had grade point averages of 3.40. The 2 students in the target date group who received an "F" and an "I" grade were both freshmen.

Students in the control group also had a slightly higher mean score on the pretest than students in the target date group, 44.12 (SD = 8.22) and 42.24 (SD = 10.24) respectively. A t-test on these data also failed to reach significance, $t(97) = .10$. Pretest scores were not available for 5 students in the control group.

It was concluded that the two groups were equivalent with regard to grade point averages and pretest scores.

Rate Measures. Figure 3 presents a summary of student progress at the 3 target dates of the course. As can be seen, the variability of student progress increases at each successive target date.

The mean number of units mastered at each of the 3 target dates was computed for both groups. For the target date (experimental) group, the mean number of units mastered was .74 at target date 1, 3.27 at target date 2, and 8.72 at target date 3. For the control group, the mean number of units mastered at the 3 target dates were .63, 3.30, and 8.50, respectively. The target date group averaged slightly more units mastered at the first and third target dates. However, a t-test for independent means failed to reach significance at any of the target dates. At target date 1, $t(107) = .98$, NS; at target date 2, $t(107) = .10$, NS; finally, at target date 3, $t(107) = .51$, NS.

Cumulative progress graphs for students in both groups in Experiment 2 are shown in Appendix D. Relating the two experimental conditions as to whether or not the students achieved the target date goal, 3 chi square analyses (one at each target date) failed to reach significance, x^2 at target date 1 = .76; x^2 at target date 3 = .09, df = 1, NS.

Course Performance Measures. Four performance measures were also compiled for this experiment. First, means of the students' first attempt on the comprehensive final examination were computed. The mean of students in the target date group

was 88.41 (SD = 6.92) out of a possible 100 points; the mean score of students in the control group was 88.70 (SD = 8.56). A t-test performed on these means also failed to reach significance, $t(104) = .20$, NS.

A pre/post gain score was also computed as in Experiment I. The mean of students in the target date group was 45.96, slightly higher than the control group's mean of 44.56. However, a t-test performed on these means failed to reach significance, $t(95) = .70$.

Data on number of quiz attempts throughout the course revealed a mean of 14.33 for the target date group and 14.8 for the control group, means which also failed to reach significance, $t(107) = .71$.

Data on the number of quiz attempts on the same day for the students in this experiment showed that students in the target date group had a slightly lower mean number of same-day quiz attempts than students in the control group, 4.94 versus 6.04, respectively. Once again, this difference failed to reach significance, $t(107) = 1.36$.

Discussion

The target date procedure utilized in these two studies failed to produce any statistical significant differences in either the rate of student progress through the course or student withdrawals from the course. In addition, there were no differences between the target date and control groups in the performance measures investigated, i.e., pre/post gain scores, final examination scores, number of quiz retakes, and instructor-student contacts (measured in one setting). Some differences were found in the responses to a post-course evaluation questionnaire in one experiment which suggest that students found the target date procedure contributed to more efficient study and an increased opportunity to interact with others in the class. However, there were no apparent effects of the treatment on student pacing or performance.

Despite the fact that there were no treatment effects, both of the courses investigated can be labeled "successful" in that the number of students who withdraw or failed to

complete the course was low, especially in view of other courses which have been reported on in the literature. This result is particularly interesting in view of the fact that the two courses used in these studies differed in many respects (see Table 3). Experiment I was conducted at a small course in a state university. In this course, the student's grade was based mainly upon the score received on a comprehensive examination, external proctors were utilized, and the majority of the study and test questions were of the short answer essay type. Experiment 2 was conducted at a large course in a private university. In this study students received points towards the final grade both for each unit mastered and the final examination, there were no external proctors, and the majority of the questions were of a multiple choice format. The courses also differed in numerous other ways.

There are at least two possible explanations for the lack of student pacing problems in these two different courses. First, it is possible that as teachers have become more sophisticated about and experienced with behavioral instruction, they have become less likely to repeat the early problems which contributed to the large number of student withdrawals, such as poor materials, poor course management, and inadequate revision. The courses reported in these studies were taught by competent and experienced personalized instruction teachers who learned to appreciate the importance of adequate materials and management. It is quite conceivable that these experienced teachers contributed strongly to the lack of problems in both courses.

The second possibility is that the target date procedure itself also contributed to the low number of students who withdrew or received "incomplete" grades. It is interesting to note that students in both courses disagreed with the statement that they found it "frustrating" to pace themselves through the course. Perhaps there was some modeling of successful pacing by students in the target date group that had a generalized effect upon students in the control group. Further research may be able to what effect, if any, variables such as

teacher experience and modeling of effective course behaviors have upon students' rate of progress.

In behavioral instruction's relatively short history, concern with student pacing has ranged from a relatively laissez-faire attitude (Keller, 1968) to an almost overriding concern that has lead to the implementation of strongly aversive procedures (Malott & Svinicki, 1969). Many factors are responsible for these divergent attitudes. One factor is certainly the students themselves, in that they arrive at the course with varying histories and abilities. In inspecting the individual cumulative progress charts in Experiment I, for example, it is clear that student #9 (a "special" student who had already completed a degree in music) would not have come in contact with any type of pacing procedure that has yet been devised. On the other hand, student #7 may have benefited from some type of pacing assistance. From this perspective, it is clear that student pacing would be a legitimate concern of behavioral instruction, given that the purpose of behavioral instruction is to enable the largest possible number of students to master the course material.

On the other hand, accepting the above as the purpose of behavioral instruction raises a larger question. Since these studies have demonstrated that pacing problems are not endemic to well-run behavioral instruction courses, and if the purpose of behavioral instruction is more than simply getting students through a course in a certain time period, is there still a pacing "problem"? If so, whose problem is it? Is it a problem for the student, who has to either lose the course credit or continue an added workload into another term? Is it the teacher's problem, who has to find additional time for students who were supposed to have completed the course? Or is it the administrator's problem, who has to go through the added expense of record-keeping and advising these students? These questions are important only in that they should be answered before we set abput spending limited resources on solving problems that may not truly exist. Behavioral instruction, with its unique capacity for generating data, will only be of

value to education if that capacity is used to effectively challenge the assumptions of education. Depending upon the answers to the above questions, perhaps the most effective way to "solve" the pacing problem would be to conduct well-designed research on variables such as course materials and management.

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Table 3

Summary of comparisons between courses in

Experiment 1 and Experiment 2

	Experiment 1 (WVU)	Experiment 2 (GU)
Type of institution	Public	Private
Number of course credits	3	4
Course Level	Introductory	Introductory
Number of students enrolled	10	109
Number of units	12	12 (11 with quizzes)
Number of test opportunity periods	30	23
Grading system used	Unit completion/ final exam	Point Contingency
Published study material	Yes	Yes
Final exam required	Yes	Yes
Pretest	Yes	Yes
Pre- and post-course student evaluation	Yes	Yes
Early final exams offered	Yes	Yes
Major test question format	Short answer essay	Multiple choice
Students required to generate original project	No	Yes (Unit 12)
Pacing self-monitoring system used	Yes	Yes
Number of required lectures	1	4
Number of students who withdrew/ failed to complete	1/1	1/1
Instructor-student contact data	Yes	No
Type of proctoring system used	Internal/ External	Internal
Maximum points for proctoring toward final exam score	None	12

Figure 1

Units mastered by students in both groups at the target dates.

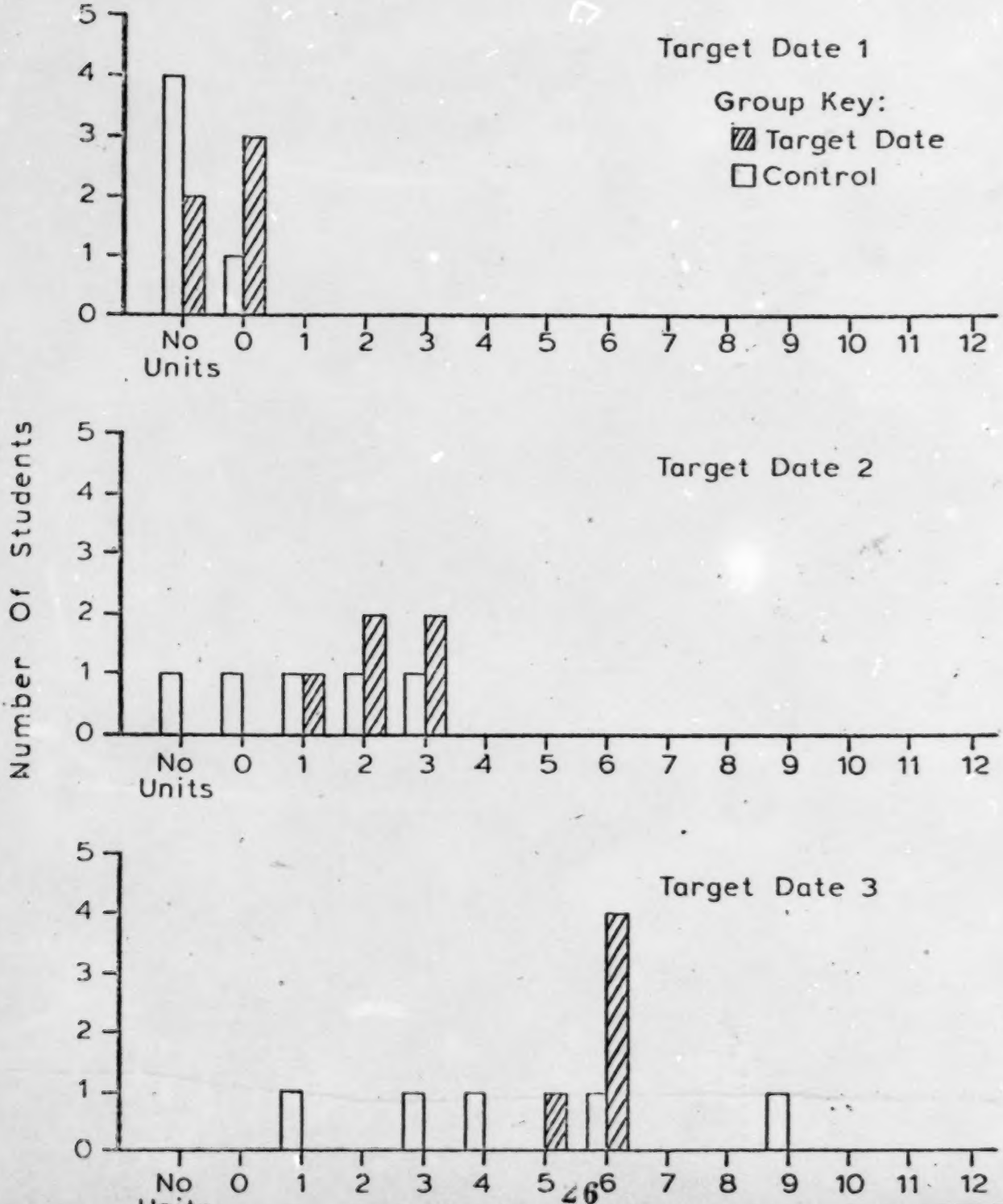
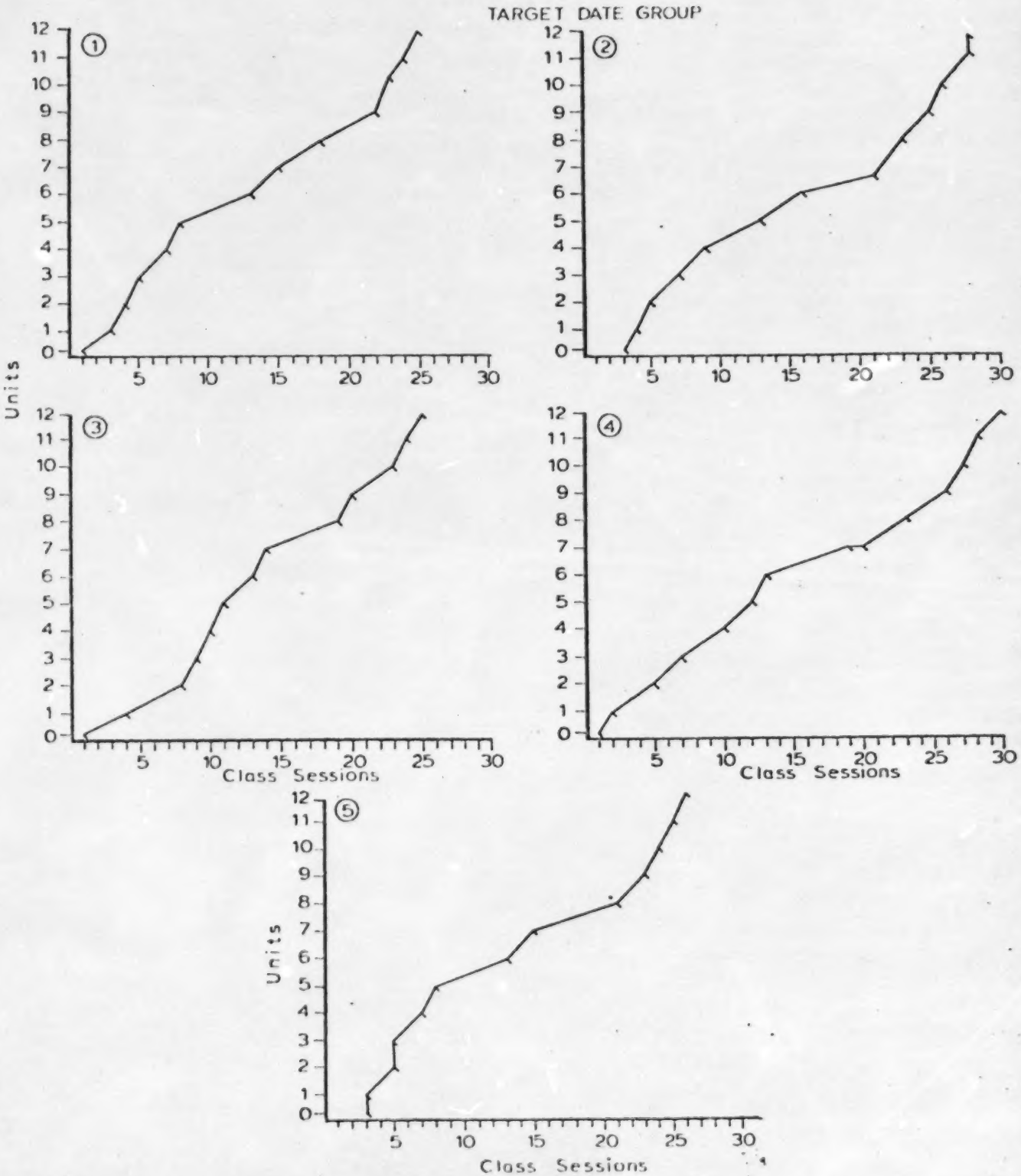


Figure 2
Individual cummulative progress graphs for students in Experiment 1.



CONTROL GROUP

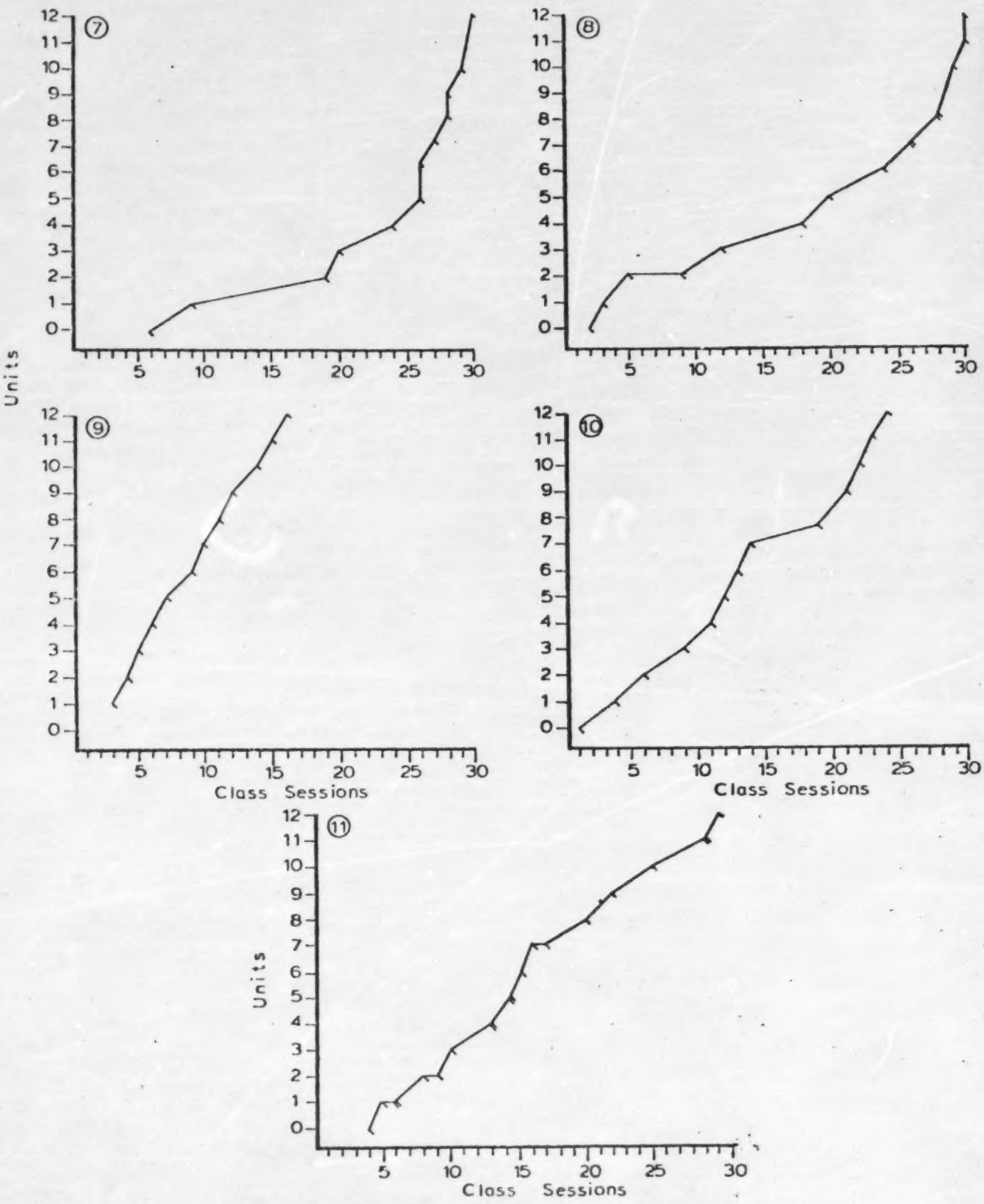
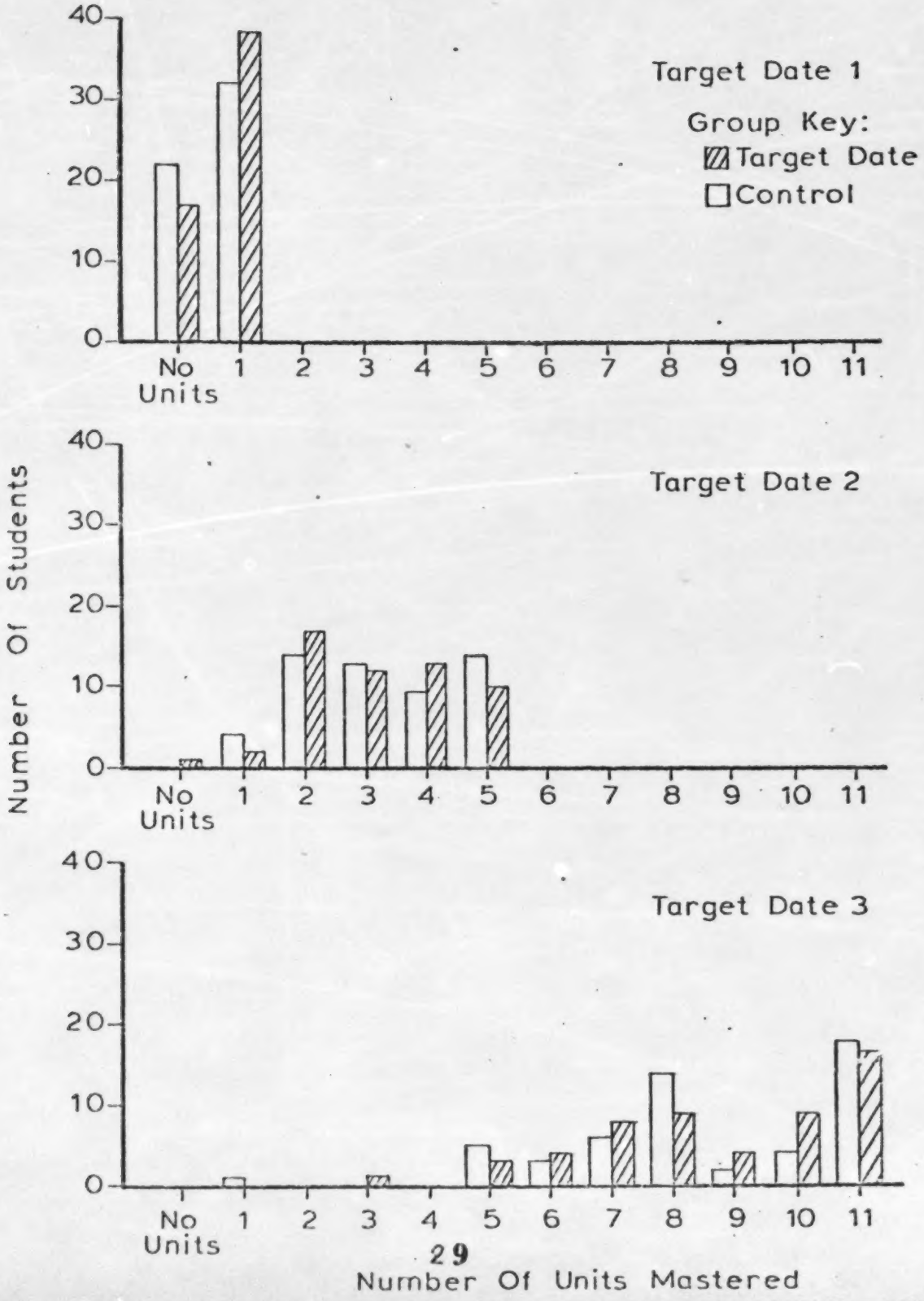


Figure 3


Target Date 1
Group Key:
Target Date
Control
40
30
20
10
0
No Units
1
2
3
4
5
6
7
8
9
10
11
Target Date 2
Target Date 3
Number Of Students
Number Of Units Mastered